

Ambient aerosol measurement during CalNex2010 using a newly developed combined Thermal desorption Aerosol GC (TAG) and Aerodyne Aerosol Mass Spectrometer (AMS) instrument: **TAG-AMS**

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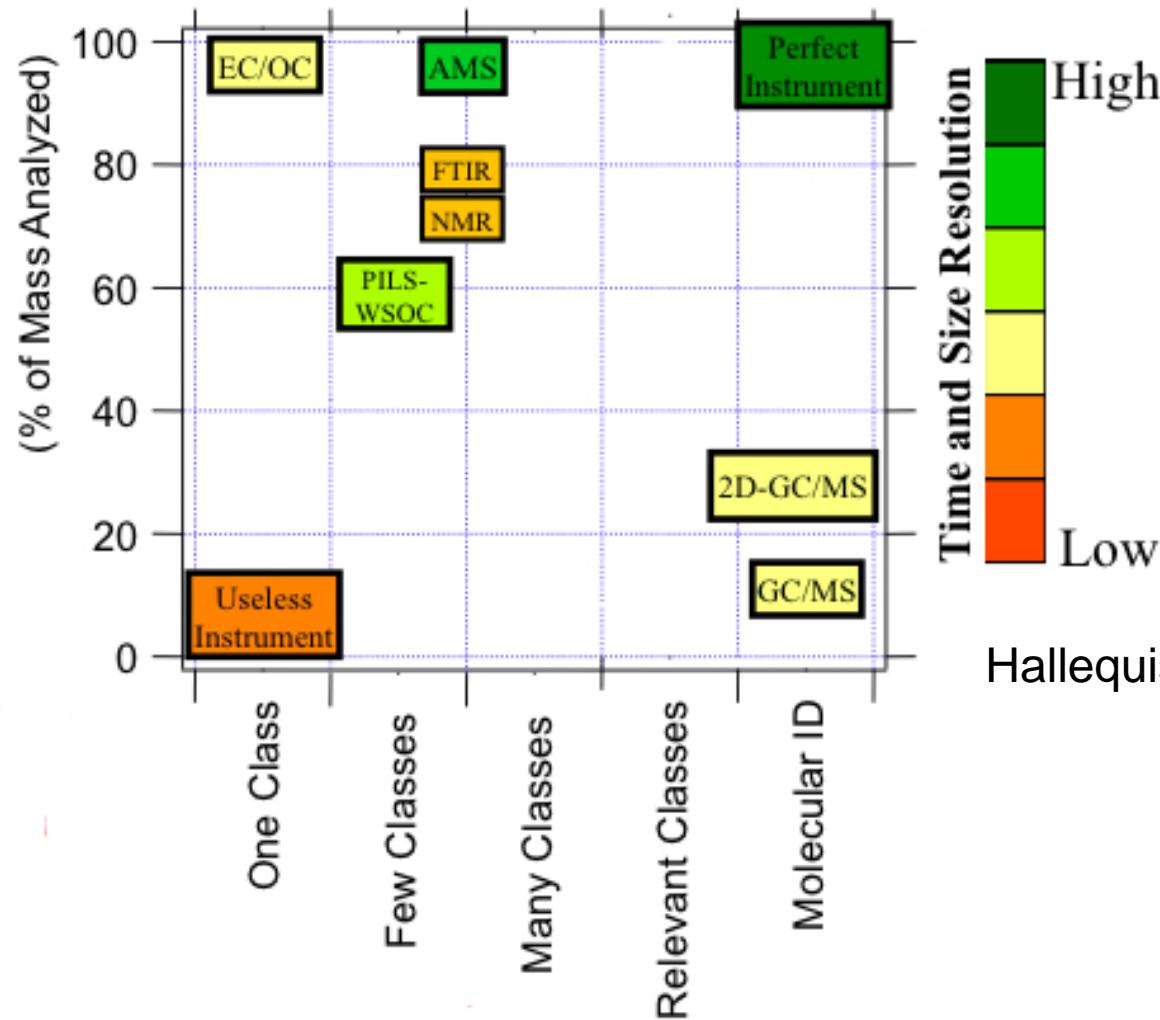
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“Towards the perfect instrument”



Hallequist et al, ACP, 2009

Thermal desorption aerosol GC/MS (**TAG**) (Williams et al, AS&T, 2006)

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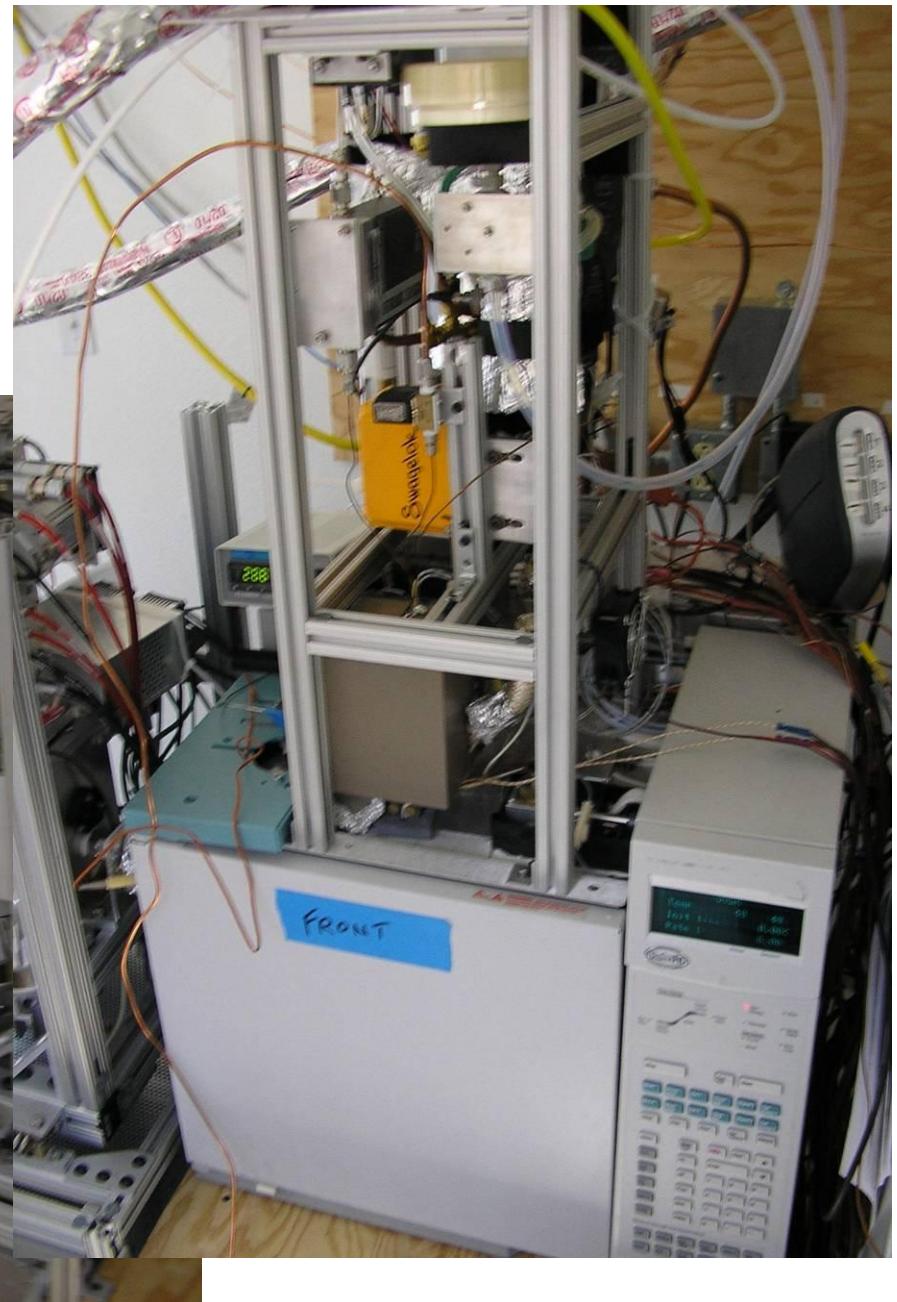
Aerosol Mass Spectrometer (**AMS**) (Jayne et al, AS&T, 2000)

First TAG-AMS field deployment

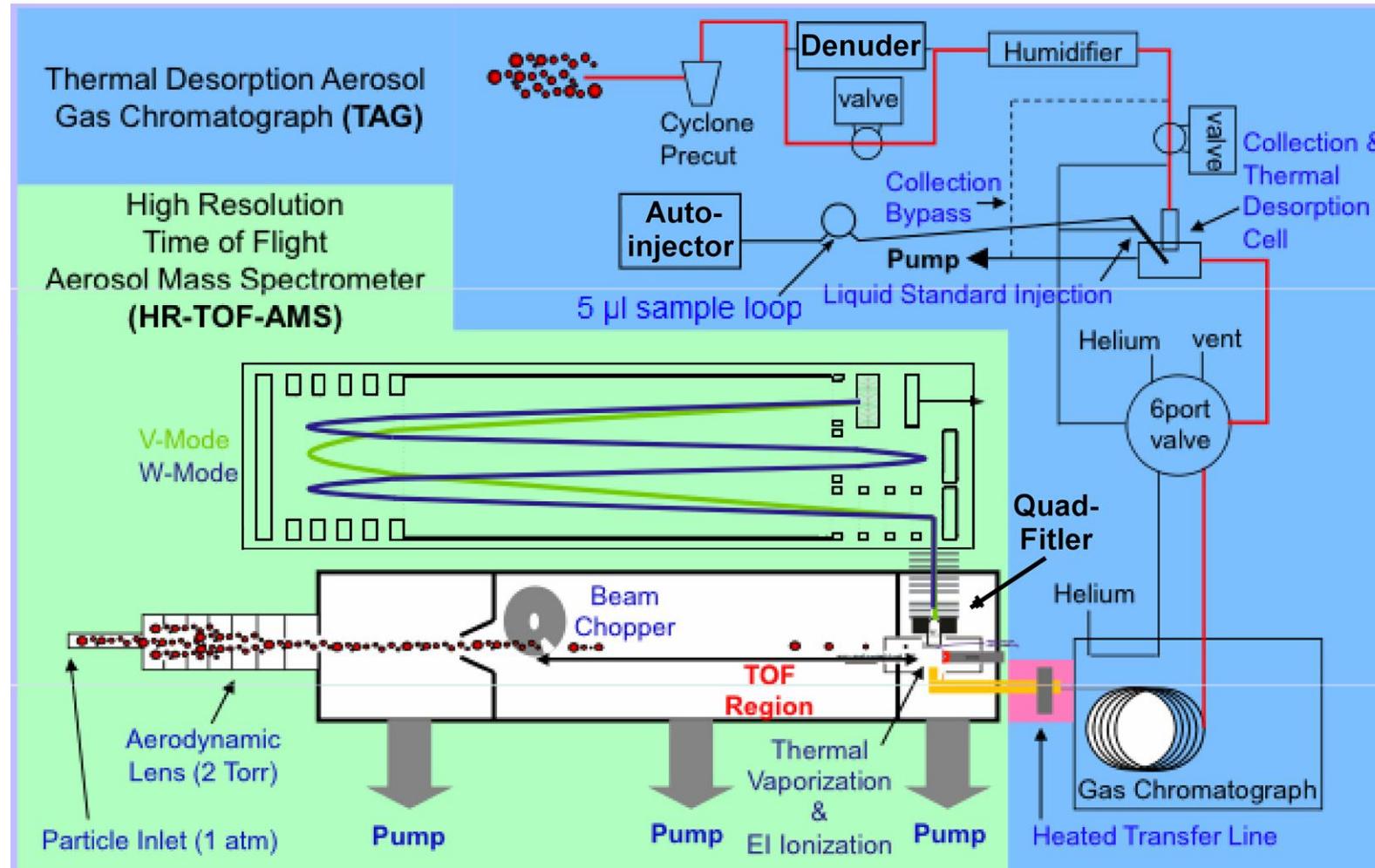


- 4 weeks' operation
- over 2 weeks of continuous measurements

TAG-AMS design



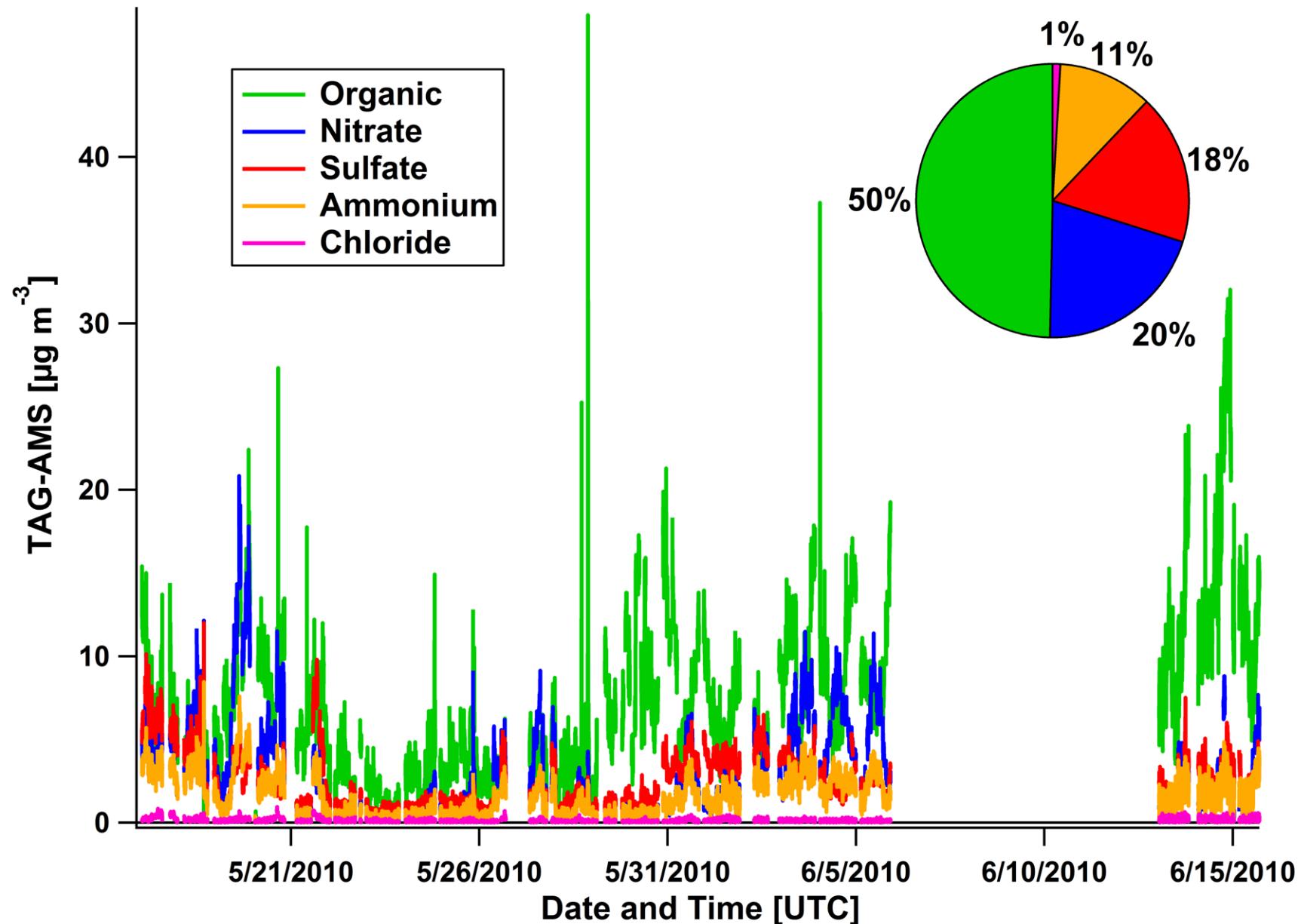
TAG-AMS CalNex design



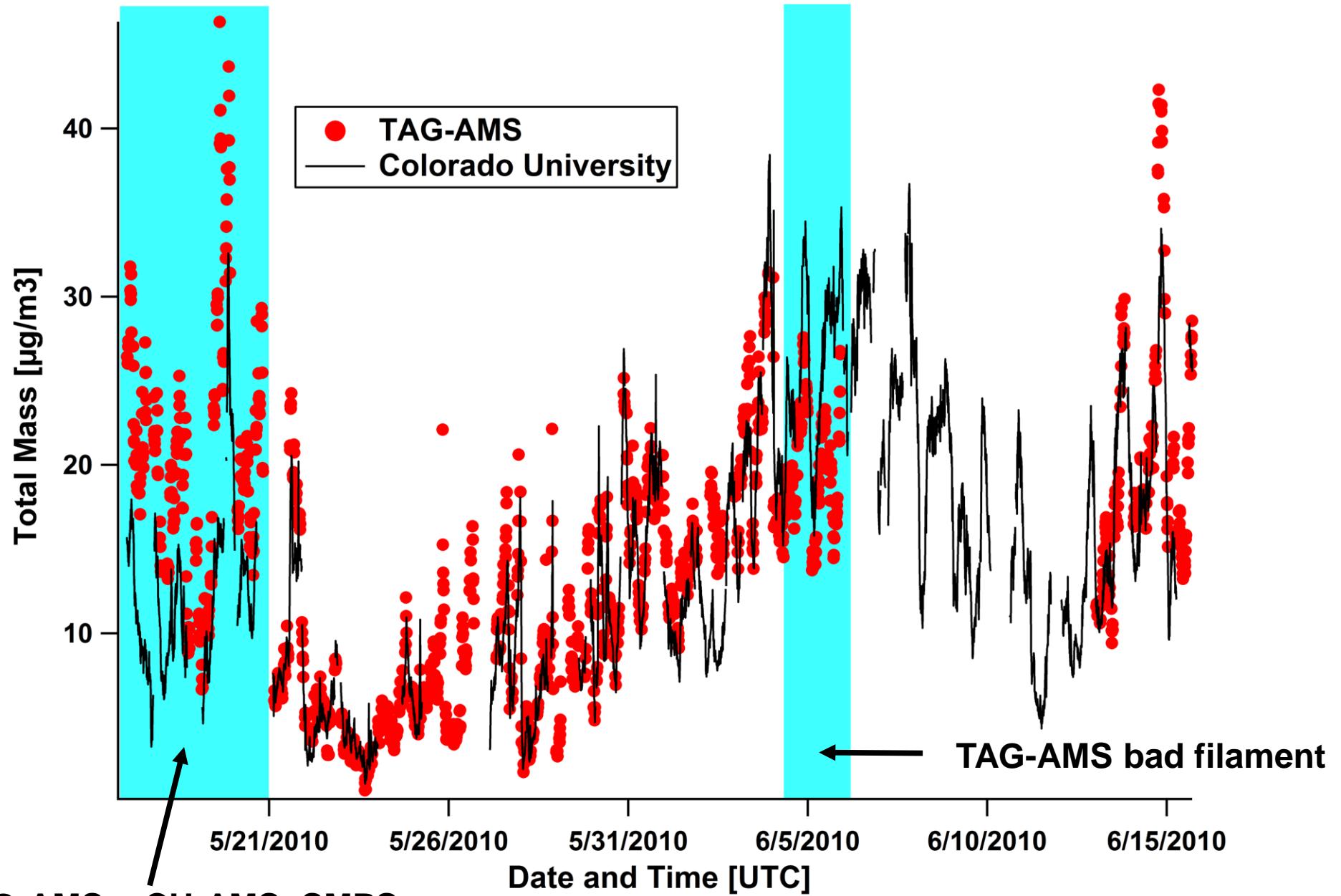
courtesy of Brent Williams

Measurement cycle (120 min):
60 min AMS measurements (V-mode) + 60 min TAG sampling, 60 min TAG analysis

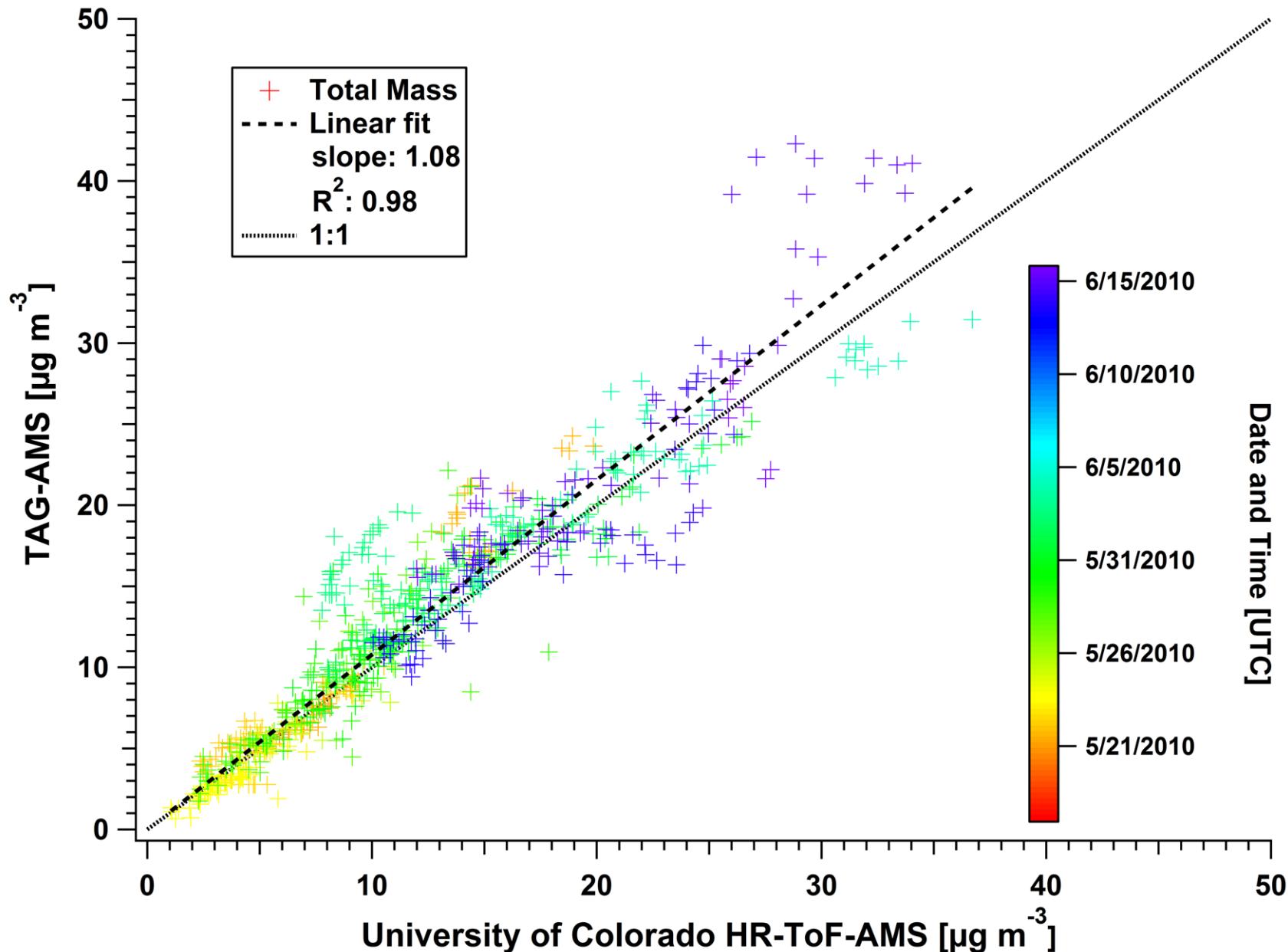
CalNex AMS data sample overview



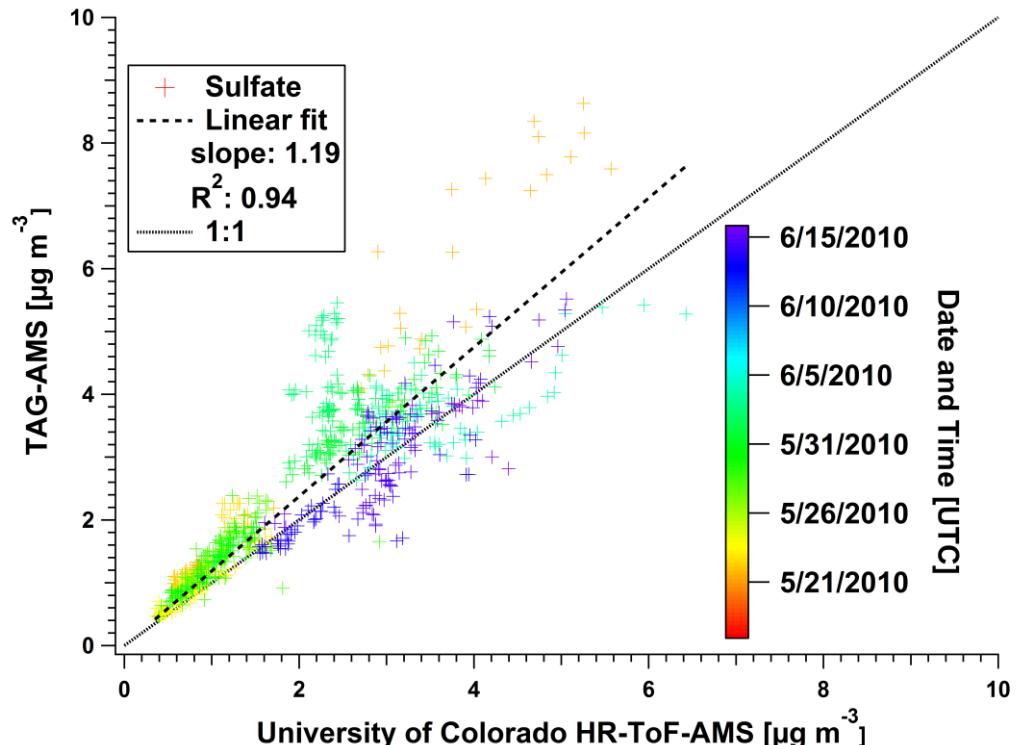
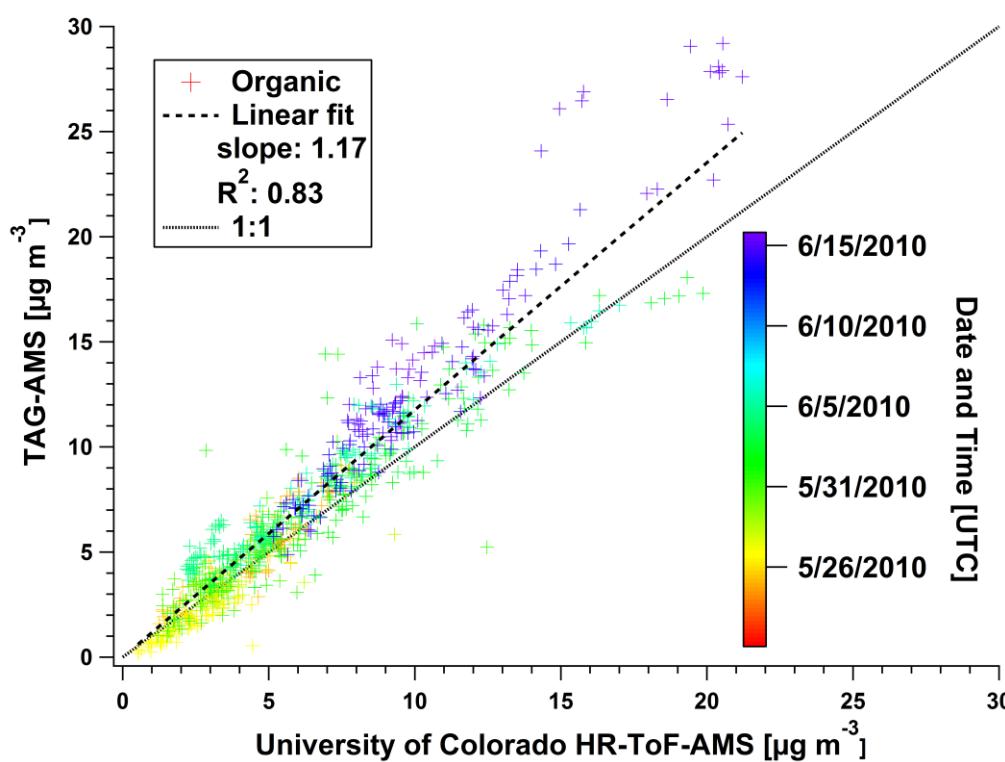
HR-ToF-AMS comparison



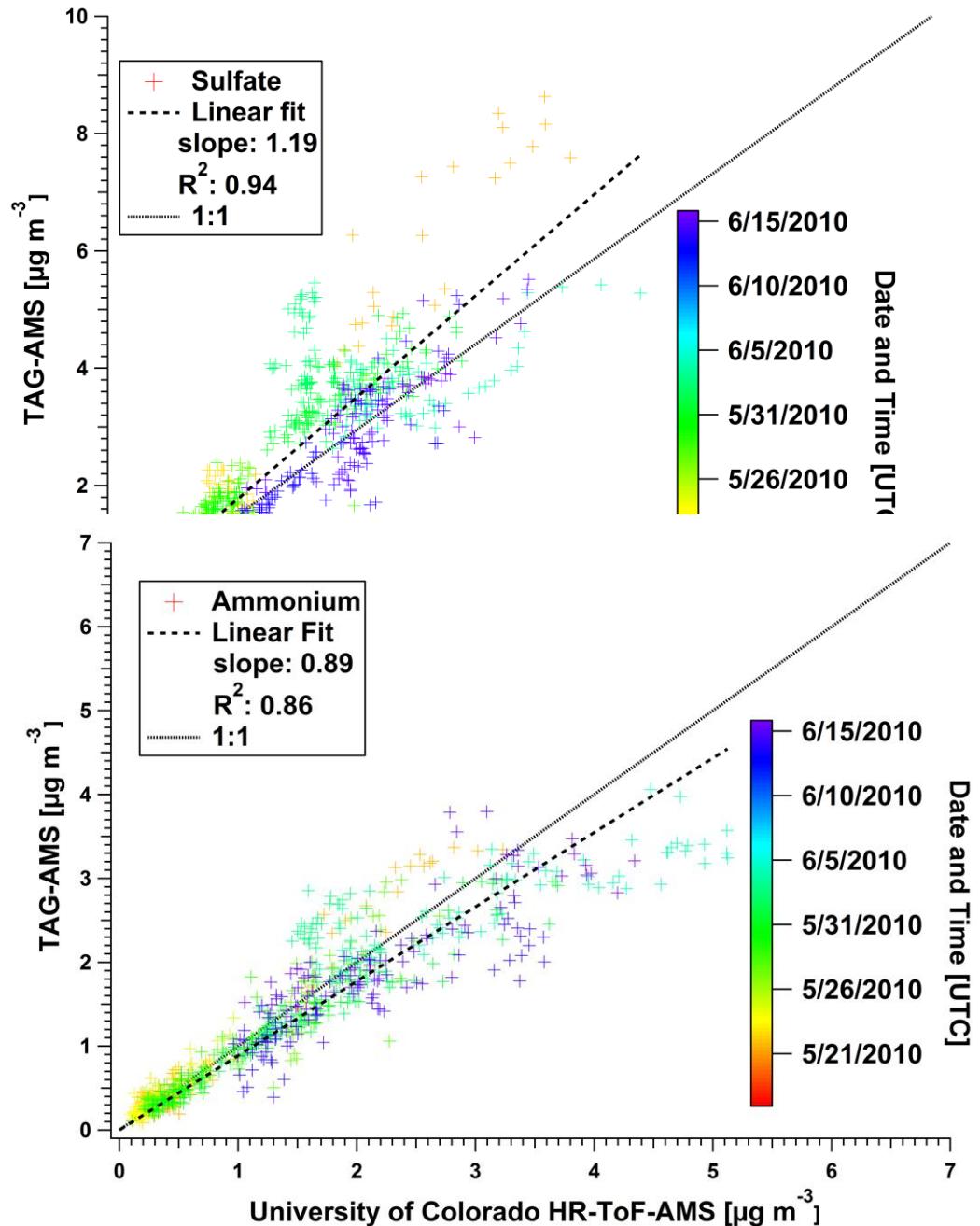
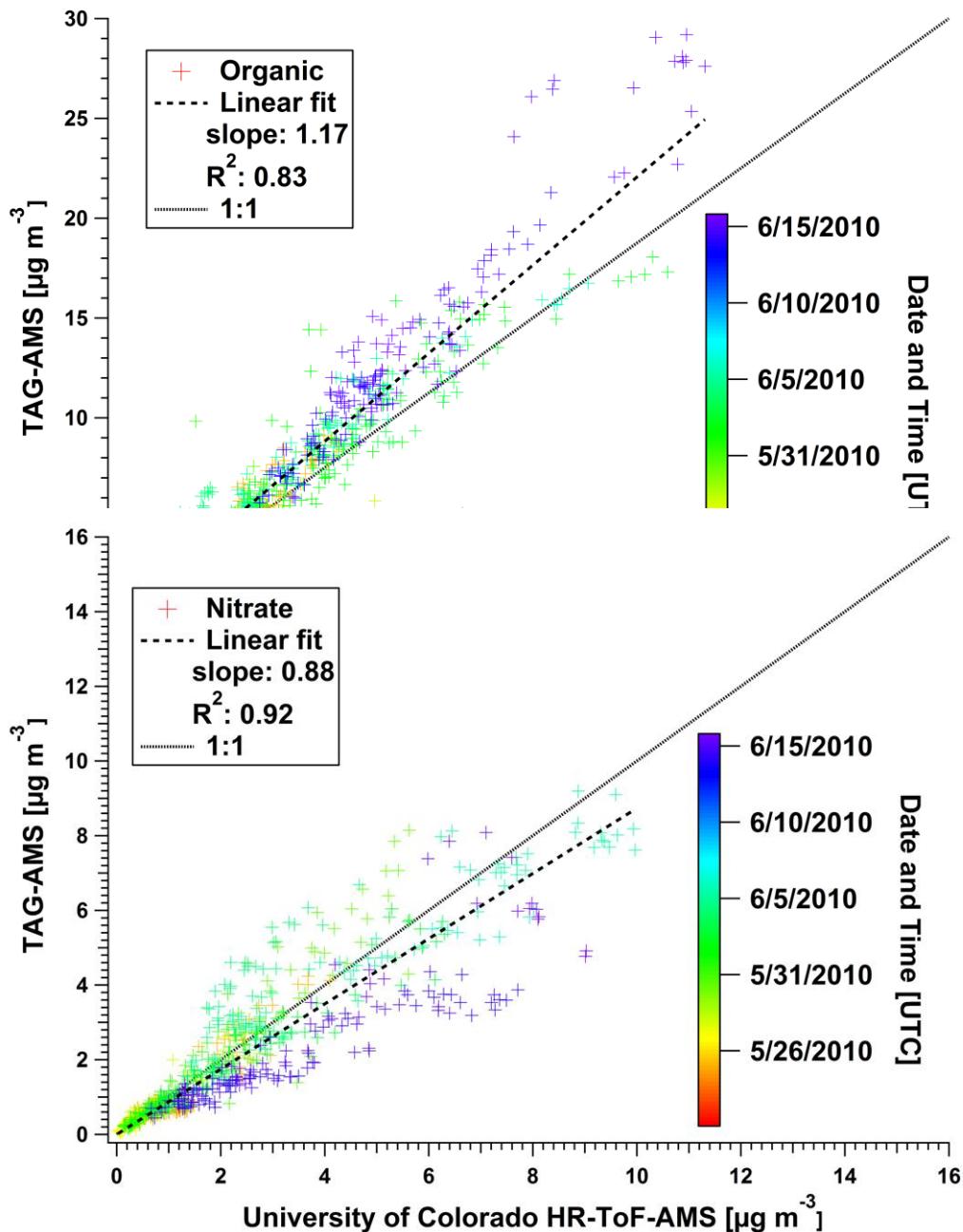
HR-ToF-AMS Total Aerosol Mass



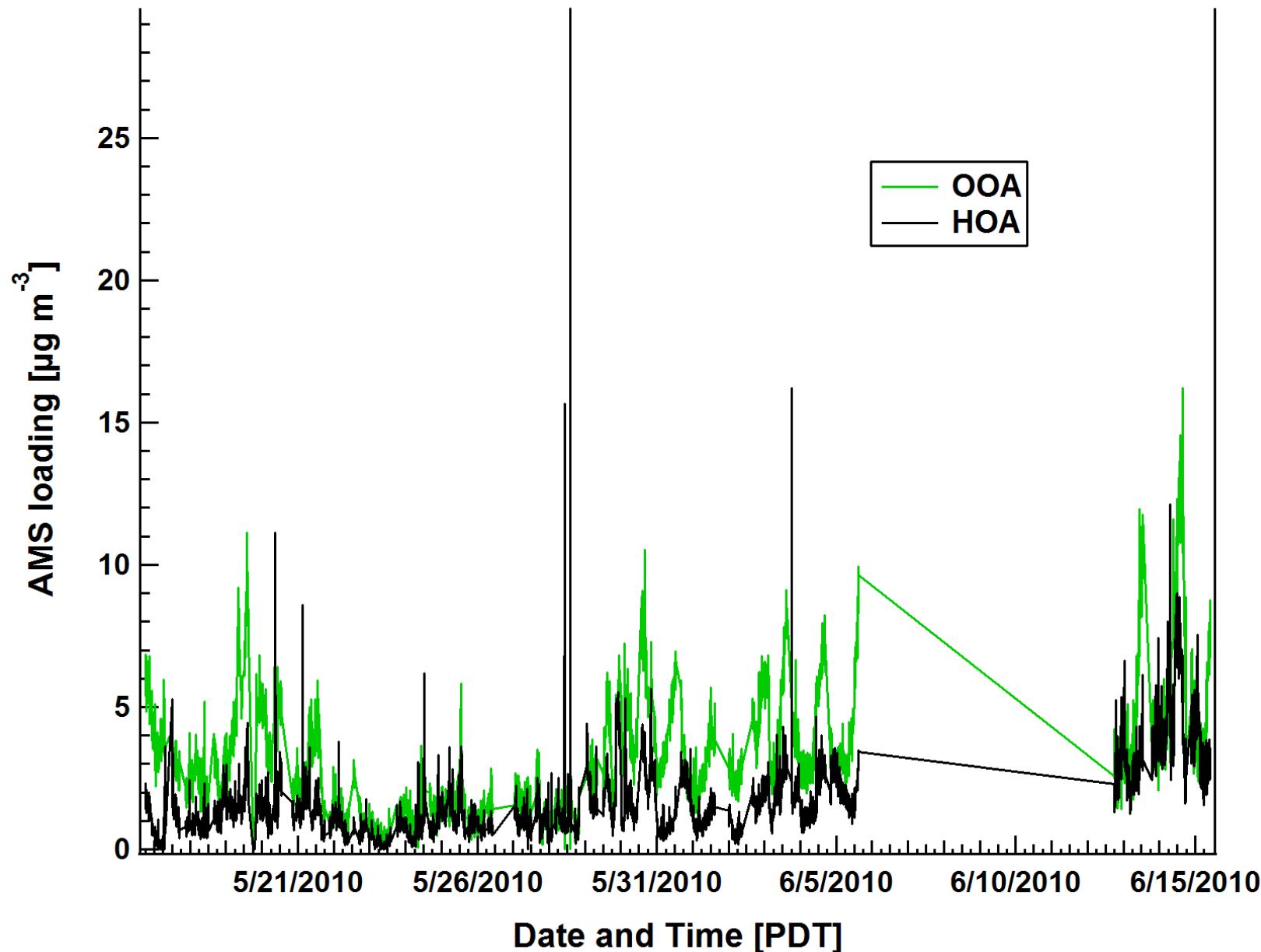
HR-ToF-AMS comparison



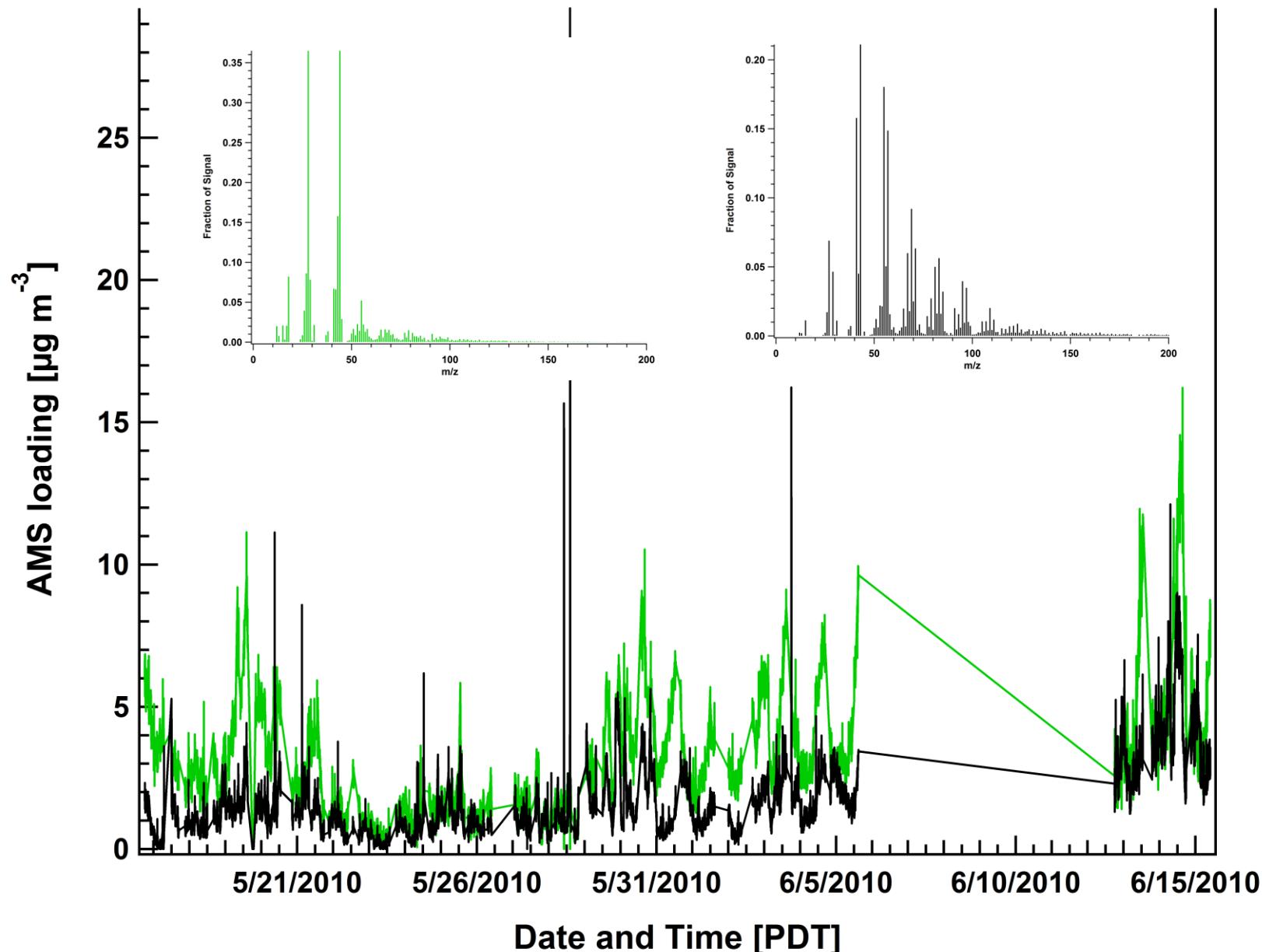
HR-ToF-AMS comparison



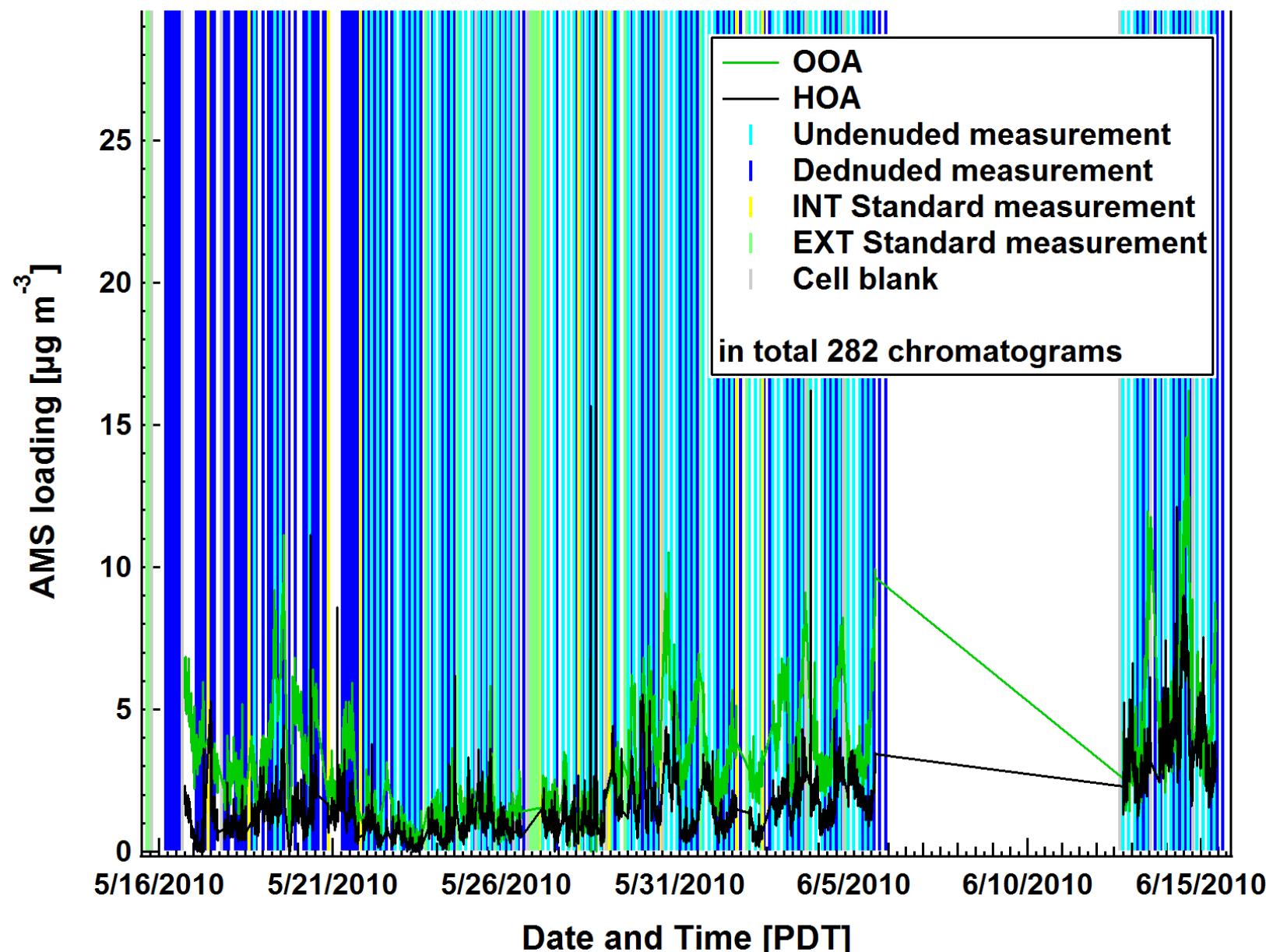
HR-ToF-AMS PMF



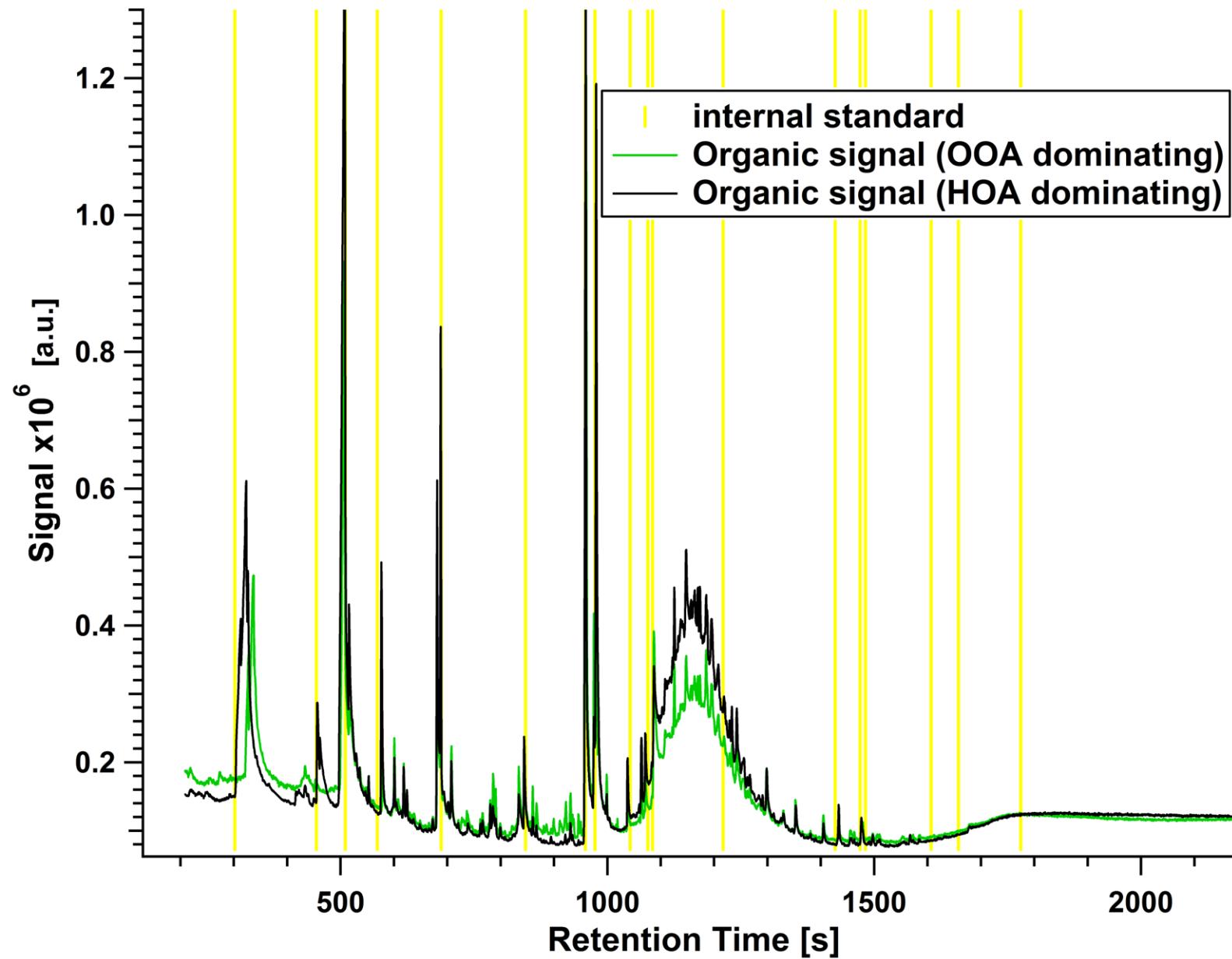
HR-ToF-AMS PMF



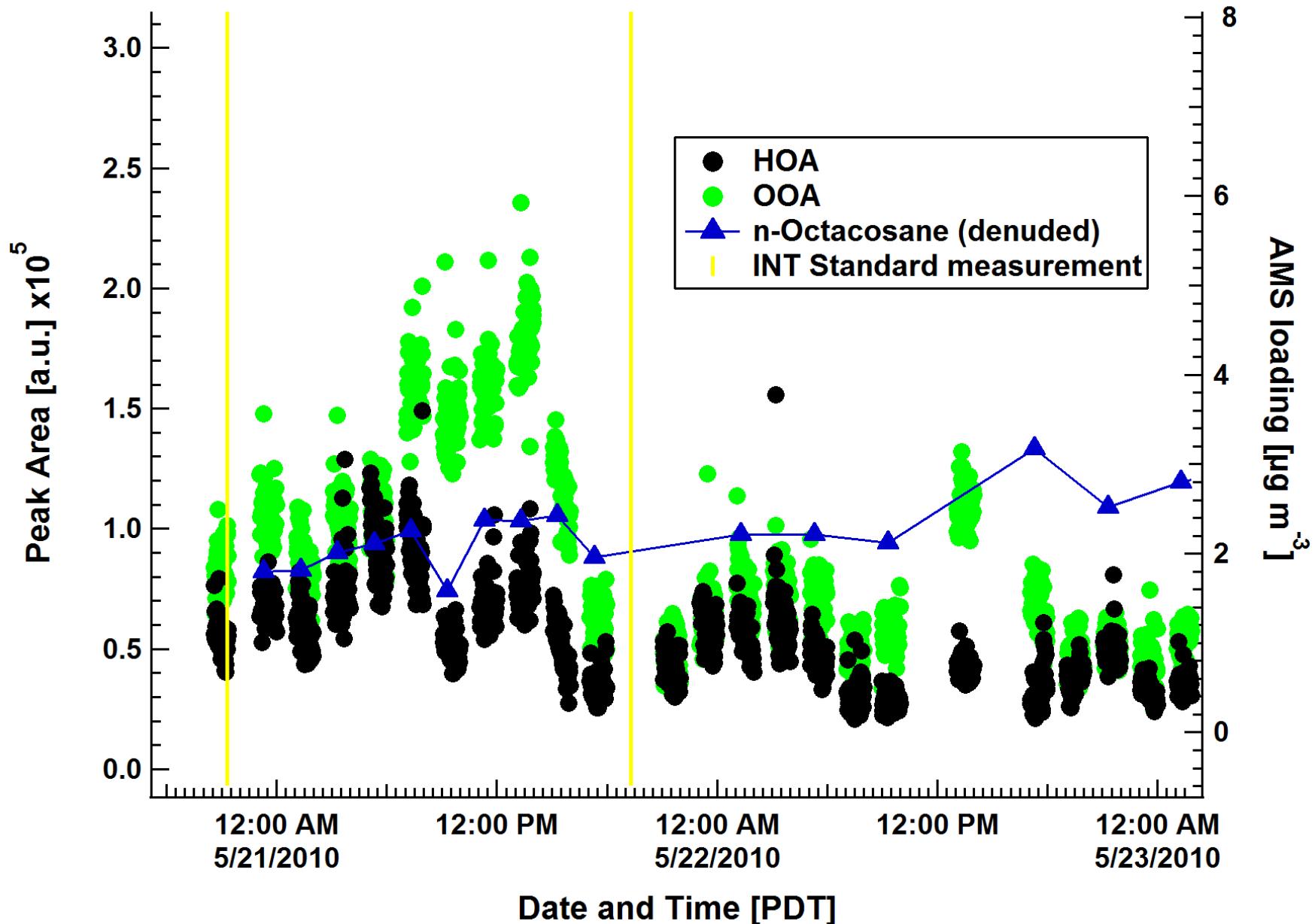
HR-ToF-AMS PMF



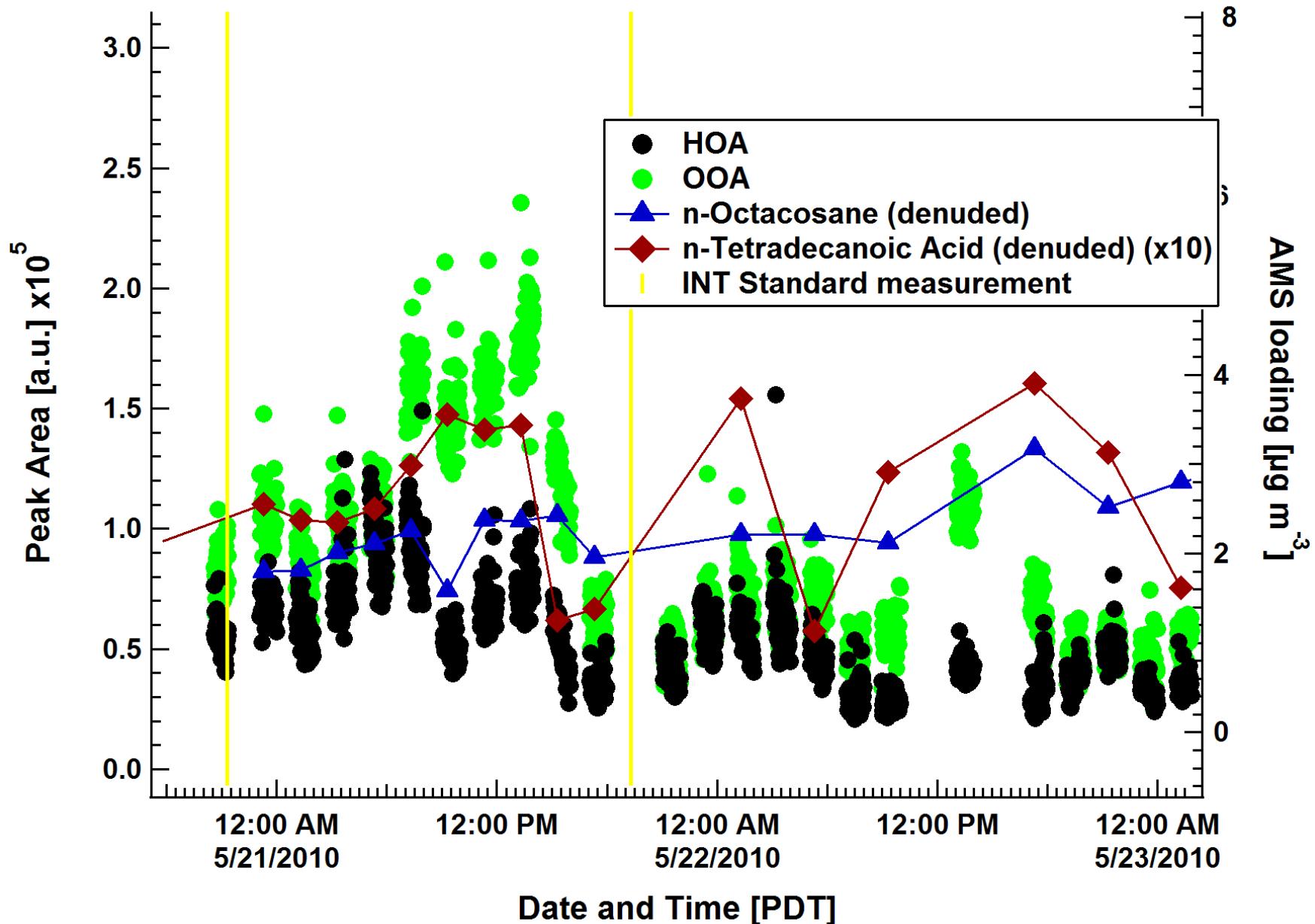
CalNex chromatogram



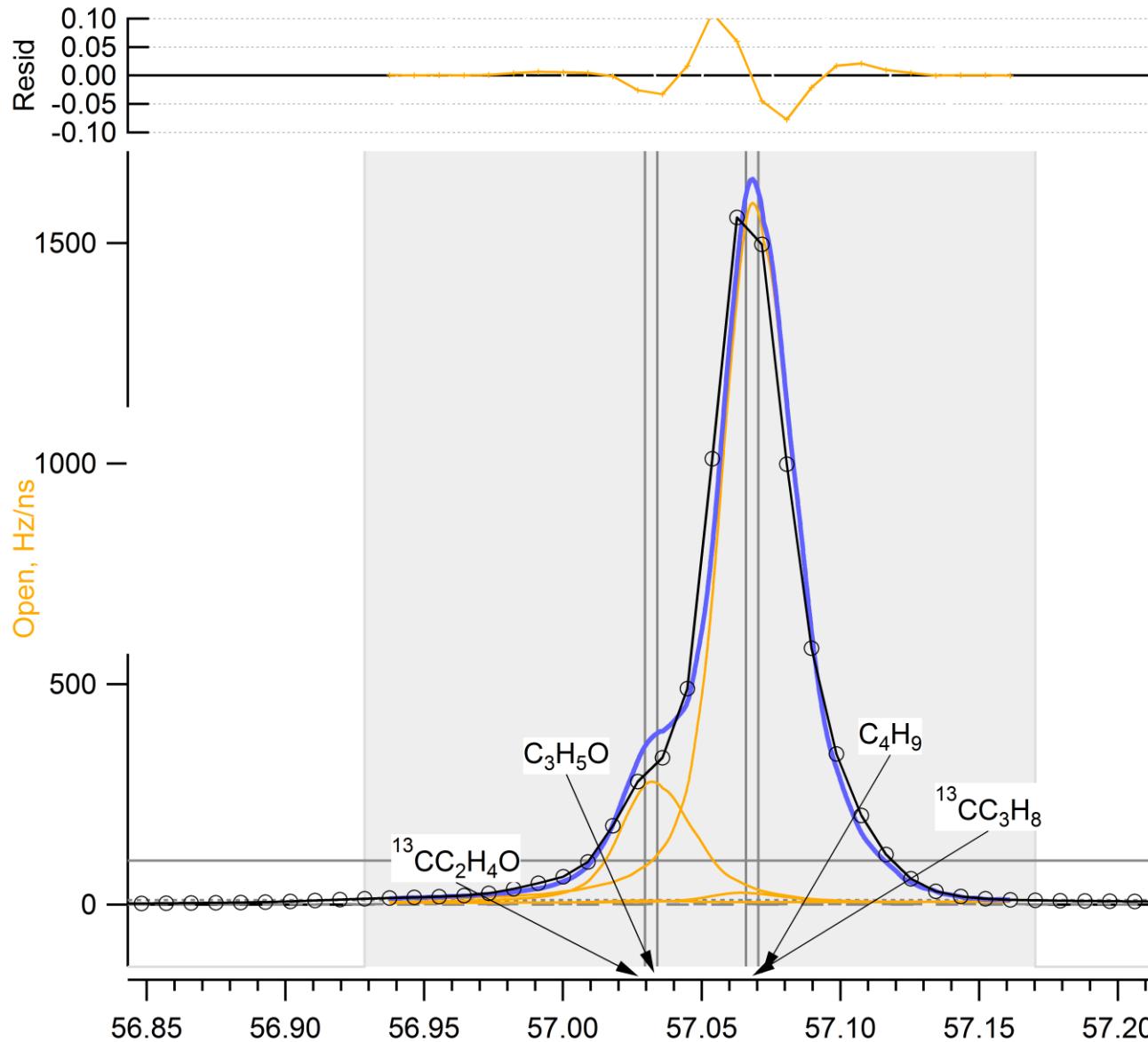
Compound Specific Time Trends



Compound Specific Time Trends



HR analysis of TAG data

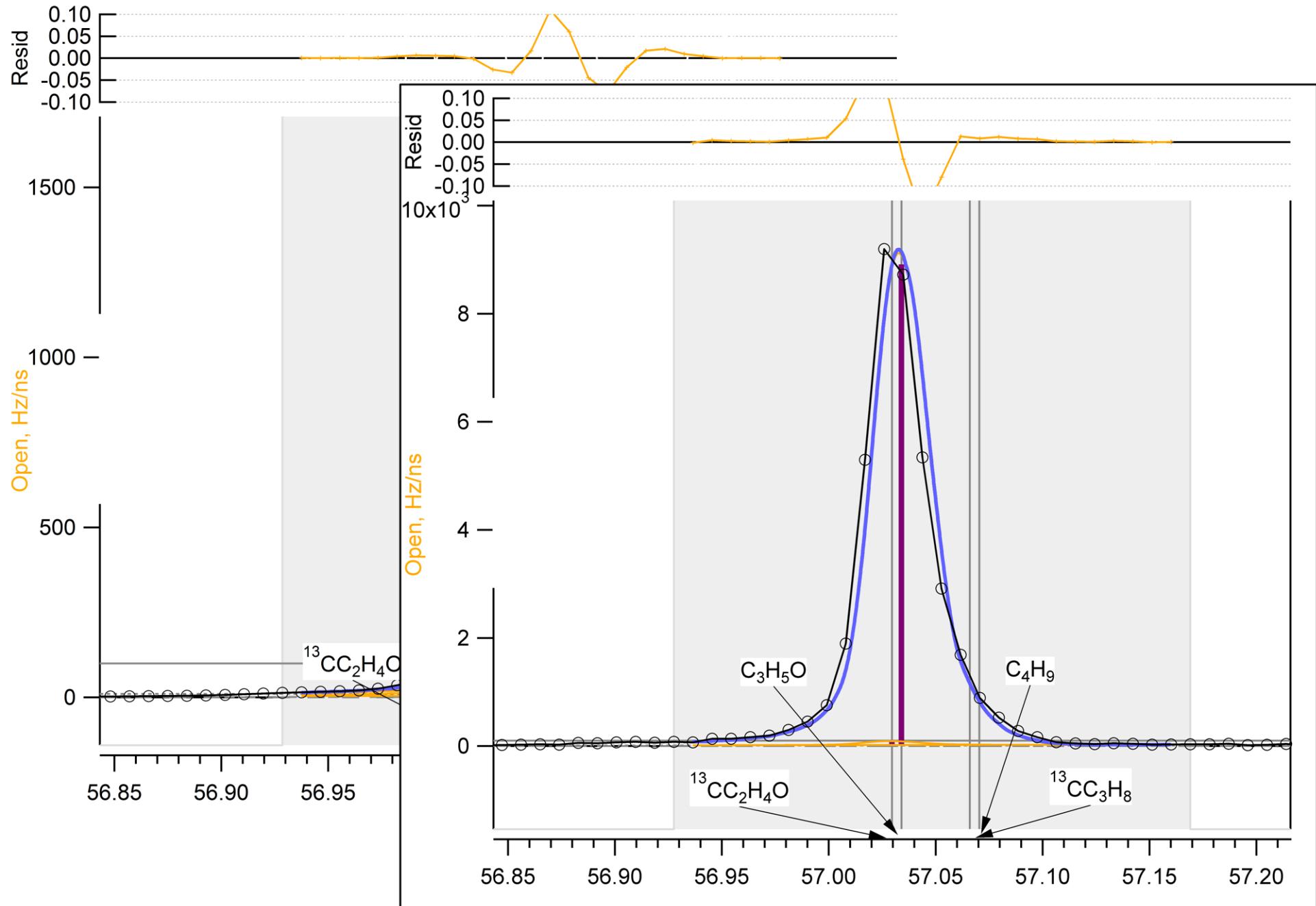


m/z 44, m/z 57 are distinctive tracers for OOA, HOA

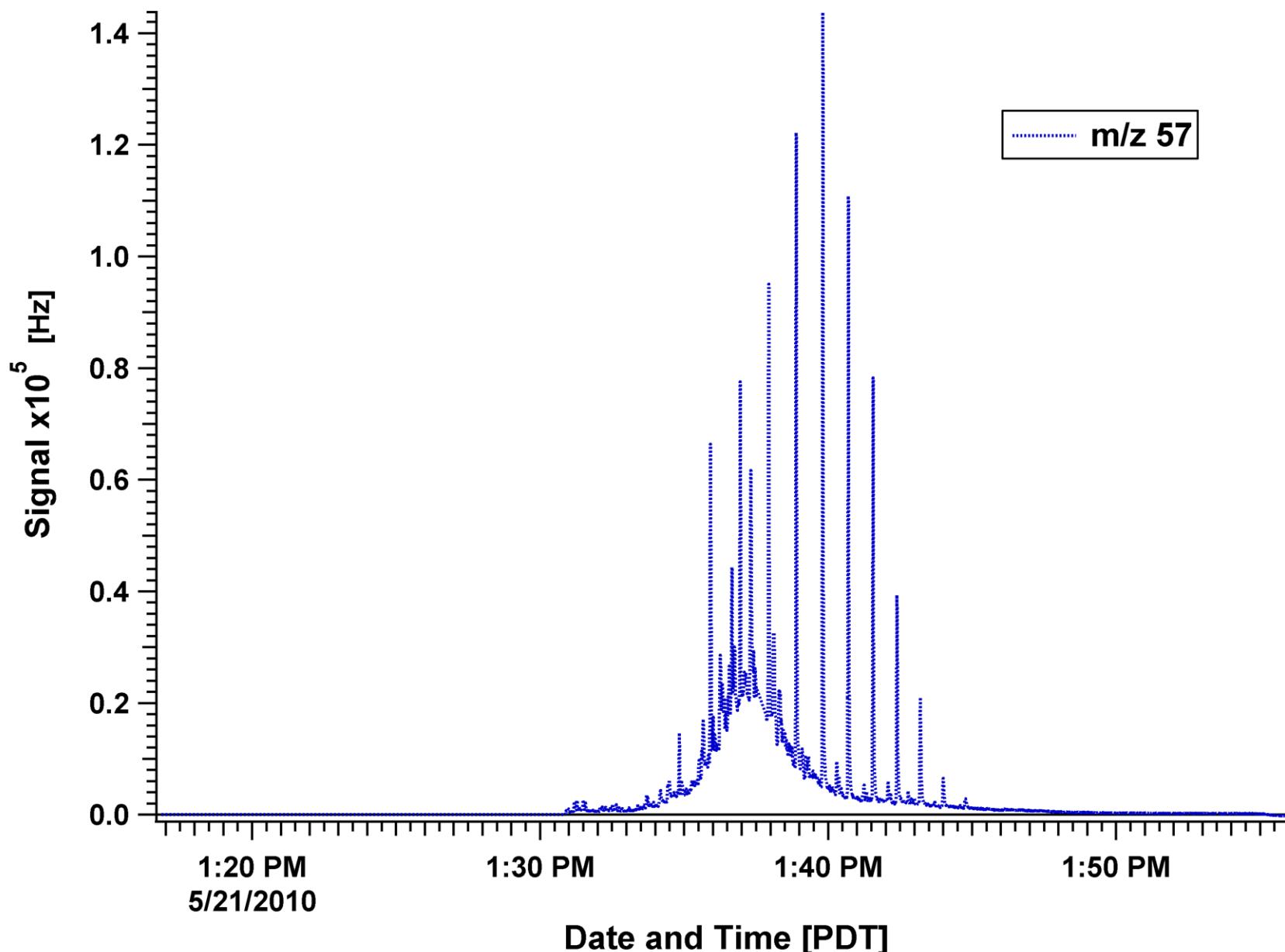
m/z 57 ion fragment is dominated by C_4H_9+ (HOA)
non-negligible oxygenated Fragment $\text{C}_3\text{H}_5\text{O}+$ (OOA)

Aiken et al., ACP 2009

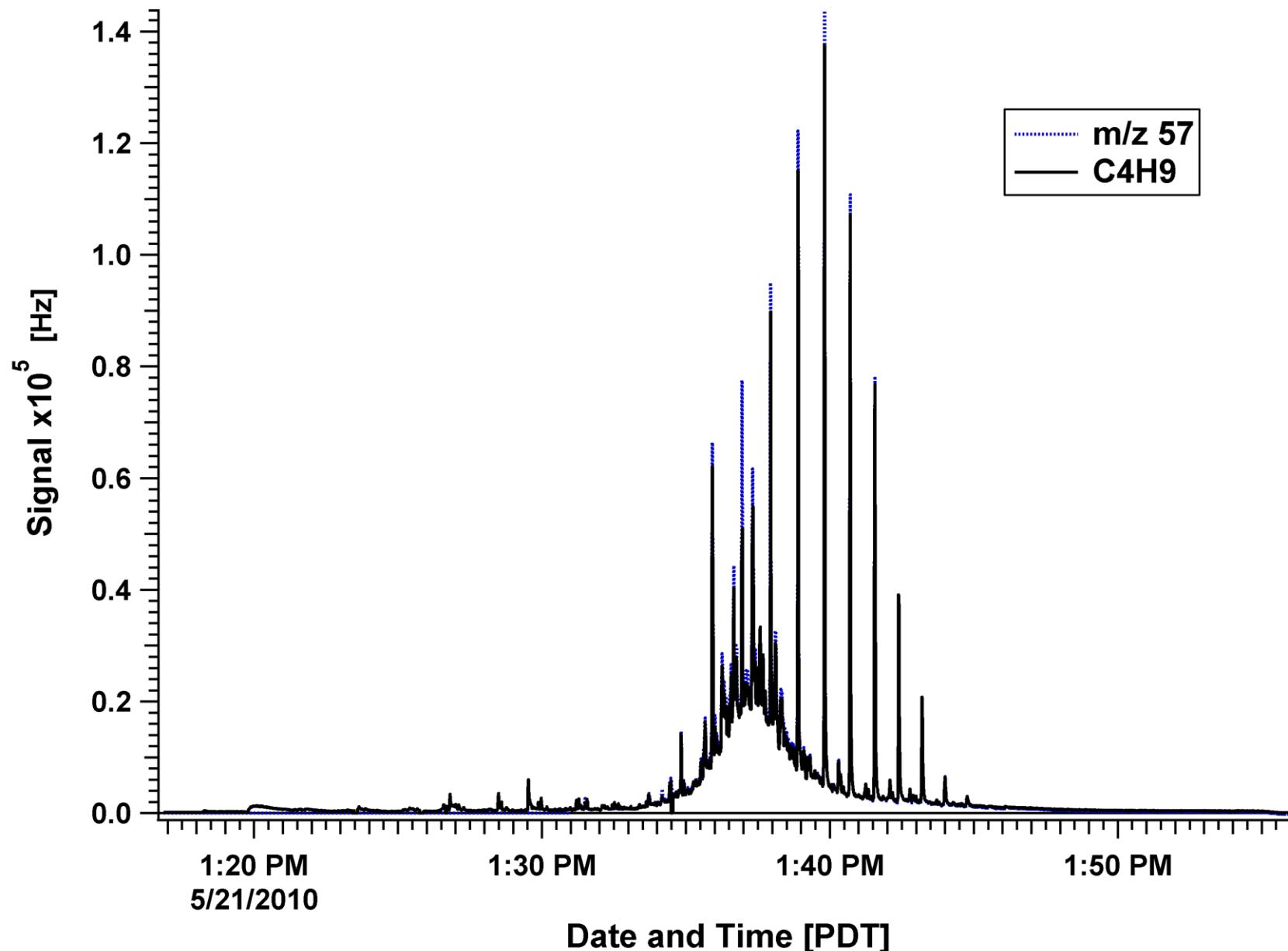
HR analysis of TAG data



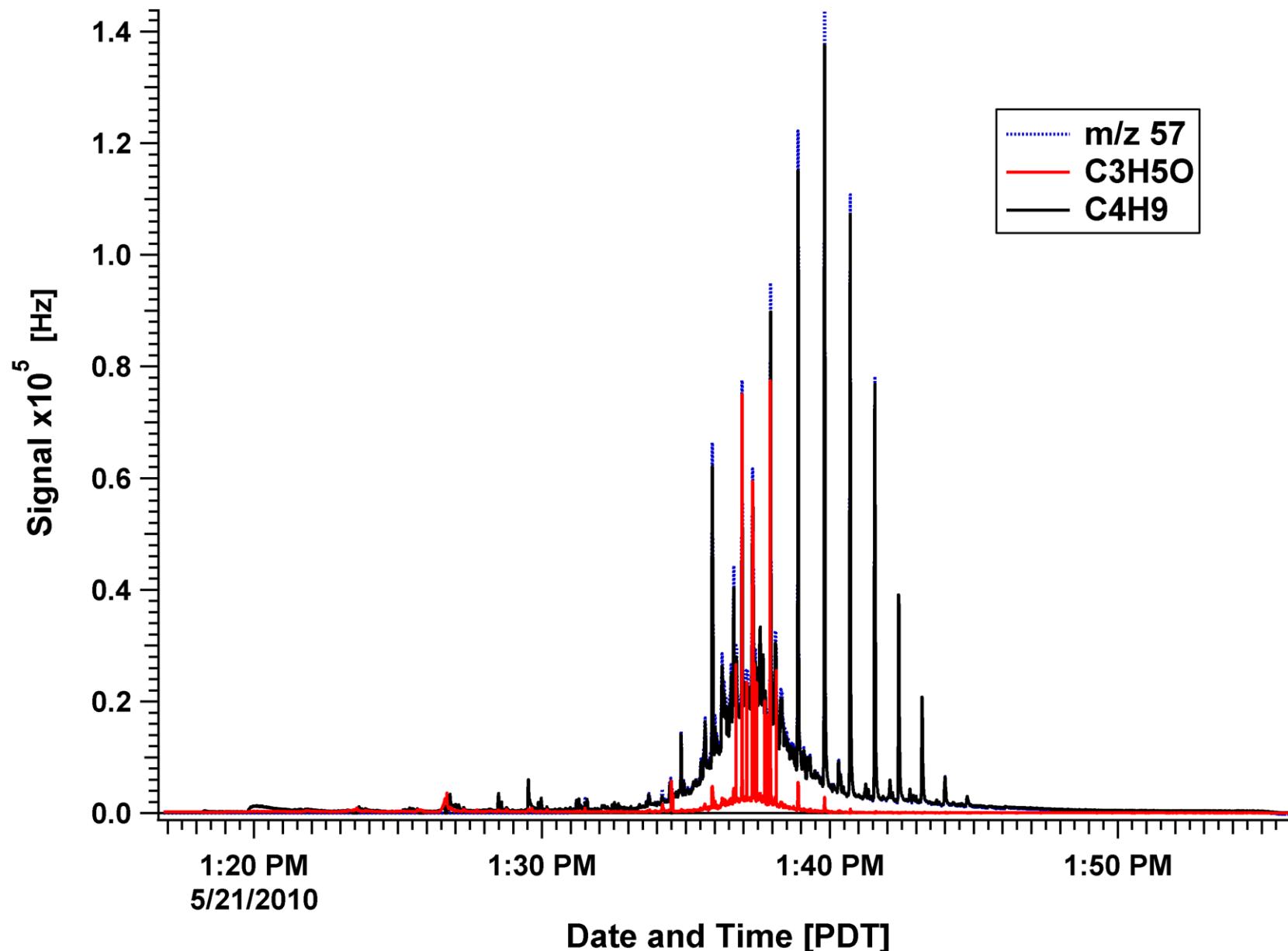
HR analysis of TAG data

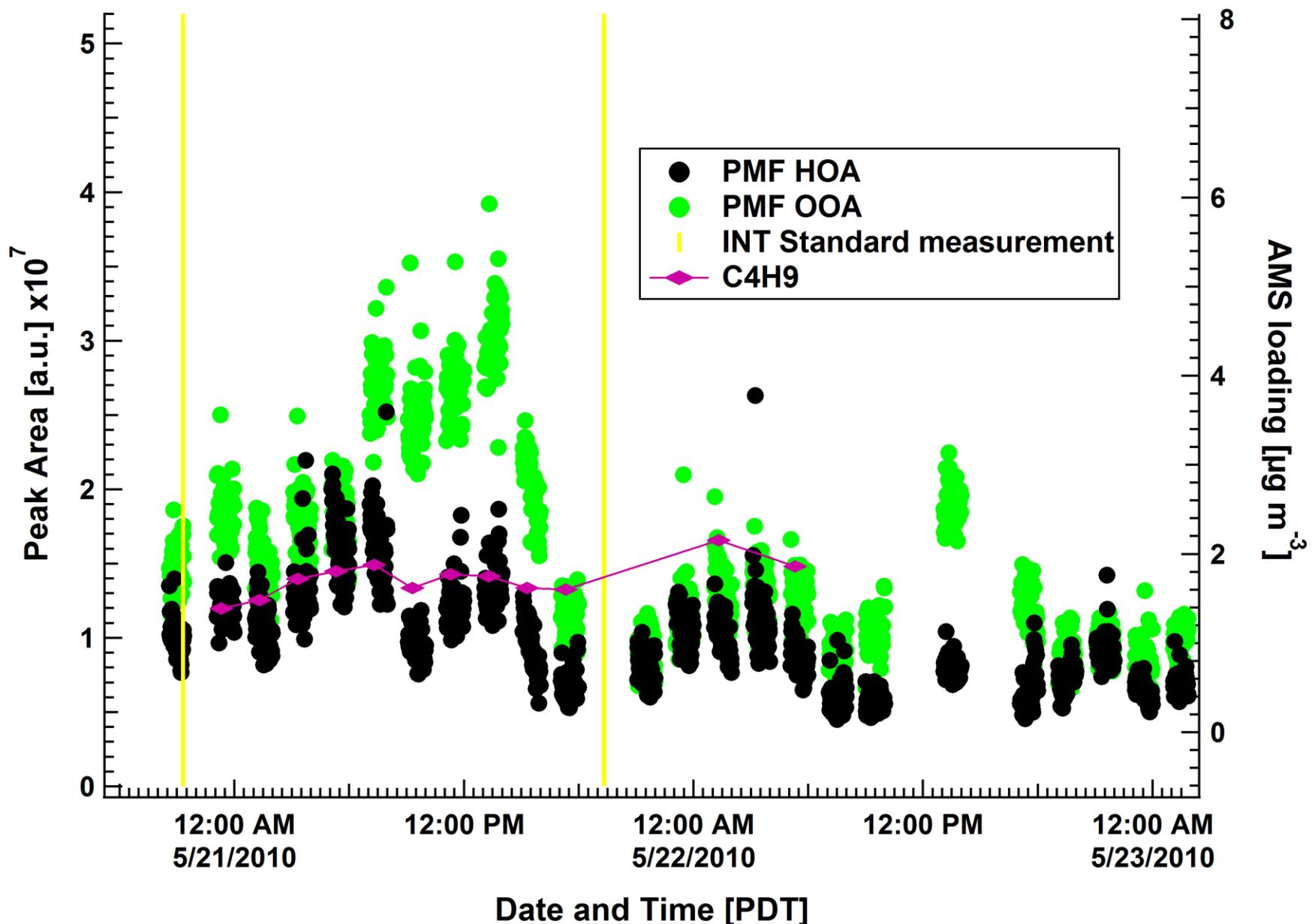


HR analysis of TAG data

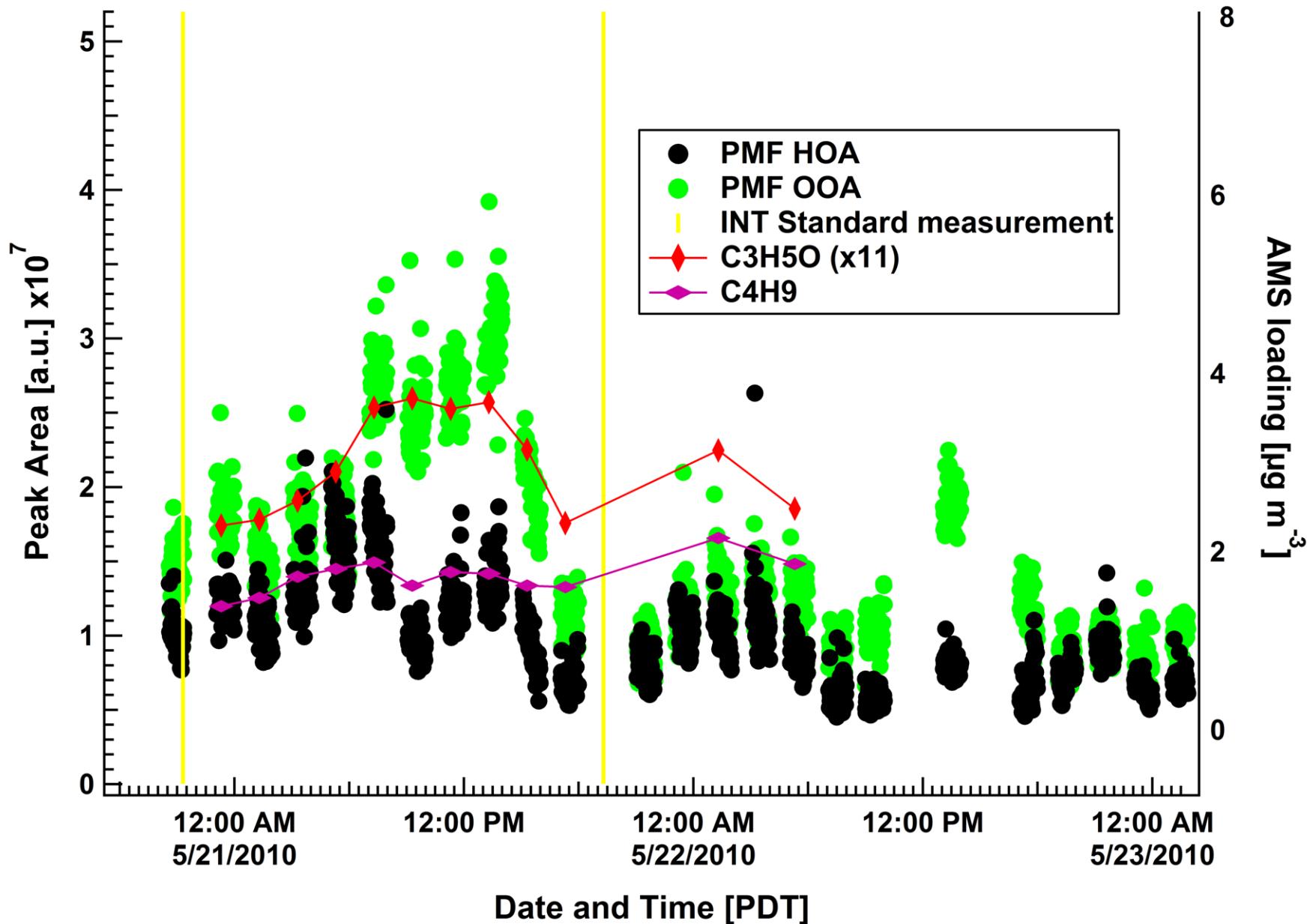


HR analysis of TAG data





HR ion Time Trends



Summary & Outlook

Standalone automated TAG-AMS measurements

Very good agreement with CU-AMS

TAG Analysis tool will be further developed/improved

Technical improvements / modularize

- CTD cell, GC oven, control unit, TAG-AMS interface
→ BEACHON 2011

PMF analysis

- TAG compounds & retention time & AMS HOA, OOA
- Extend to High Resolution analysis (PMF & H/C, O/C ratios)

Comparisons

- HR analysis of CU AMS and TAG-AMS
- Filter and TAG-AMS comparison

Acknowledgment

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Thank you for your attention!